CALIFORNIA
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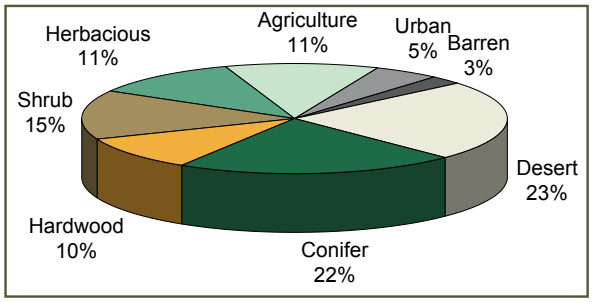
Forest Health *2009 highlights*

Forest Resource Summary

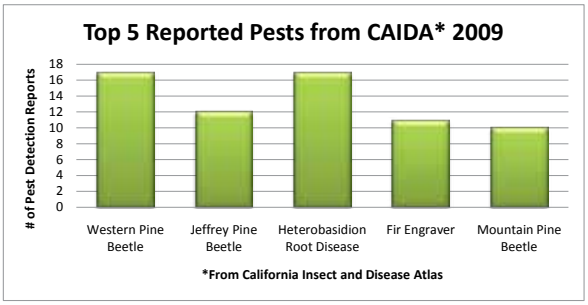
There are 18 National Forests in California, encompassing over 20 million acres. Our National Forests account for 25 percent of National Forest recreation nationwide and about half of the public wildland recreation in California. National Parks and other federal, state, county and private lands comprise the remainder. http://www.fs.fed.us/r5/

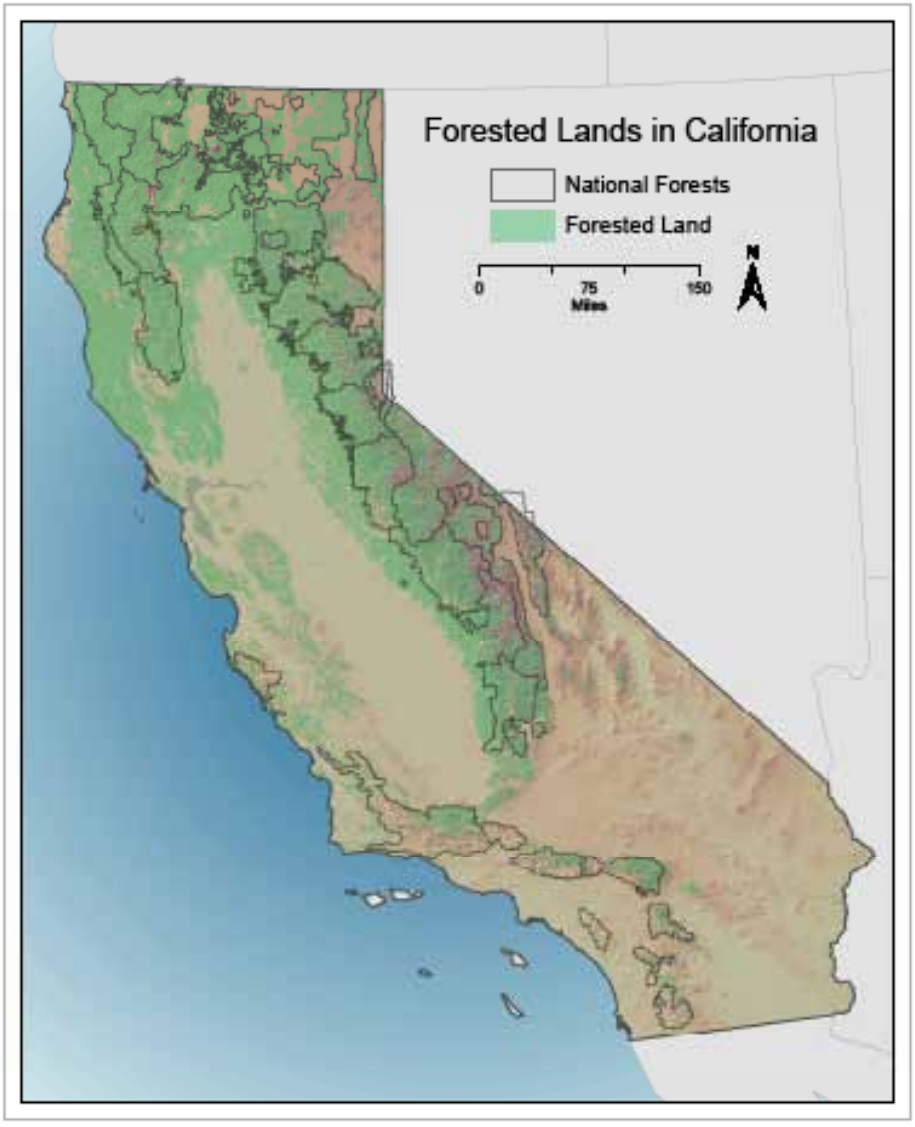
Region 5 of the USDA Forest Service works cooperatively with federal and state partners to map, measure, monitor and assess the effects of biotic and abiotic agents in California's forests. California's forests are among the most complex and diverse in the nation, with 25 major forest types occurring across 32 million acres of the state.

Approximately 33% of California is forested and is susceptible to a variety of forest pests depending largely on geographic location, tree species composition, tree stocking, drought, air pollution and other environmental factors.



California land cover types by percent of total land base.





Environmental Conditions

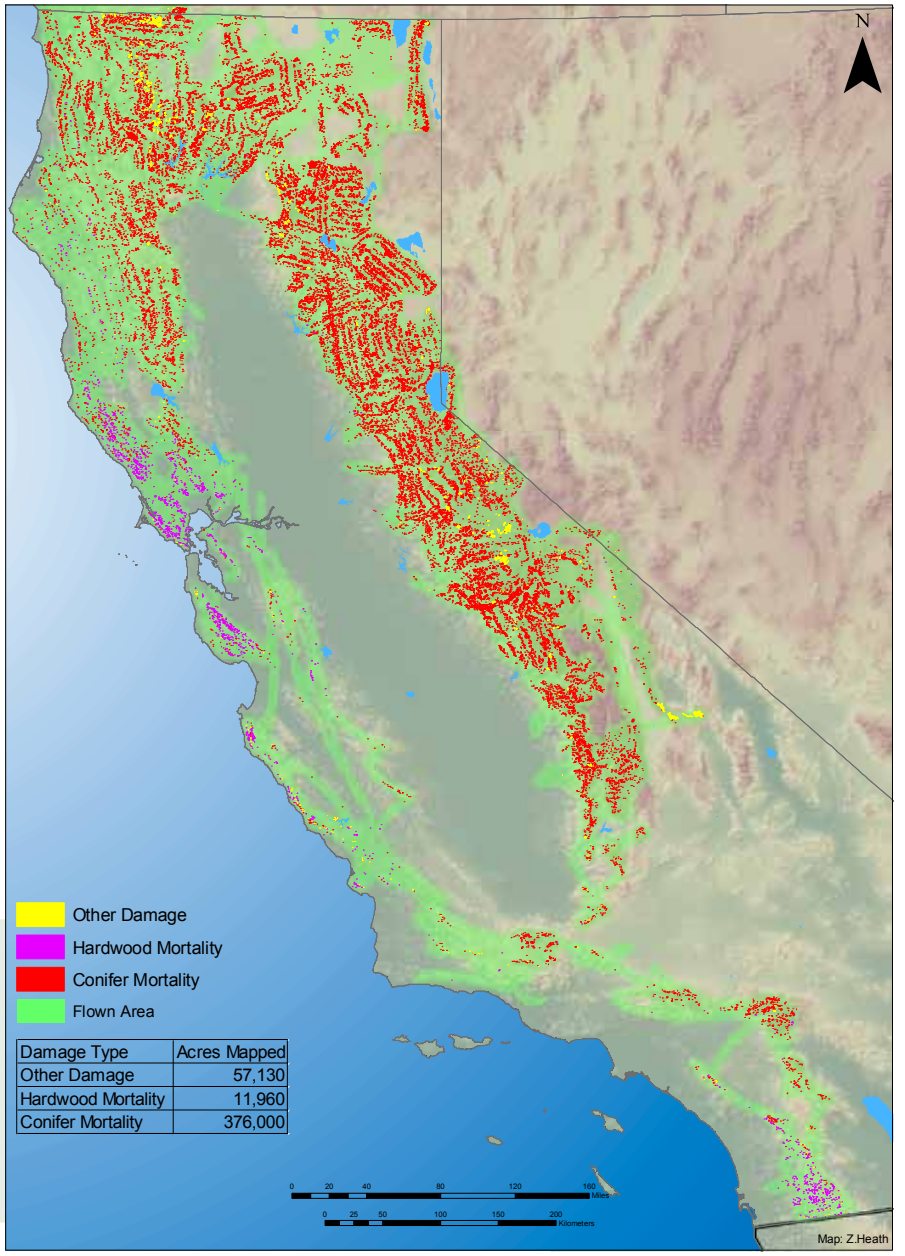
California is currently in its third year with below-average rainfall. Statewide average seasonal precipitation through April 2009 was 80% of normal, and as the year progressed water conditions declined drastically in many areas. The South Coast area of the state recorded the lowest seasonal precipitation – 60% of normal – in 2009.

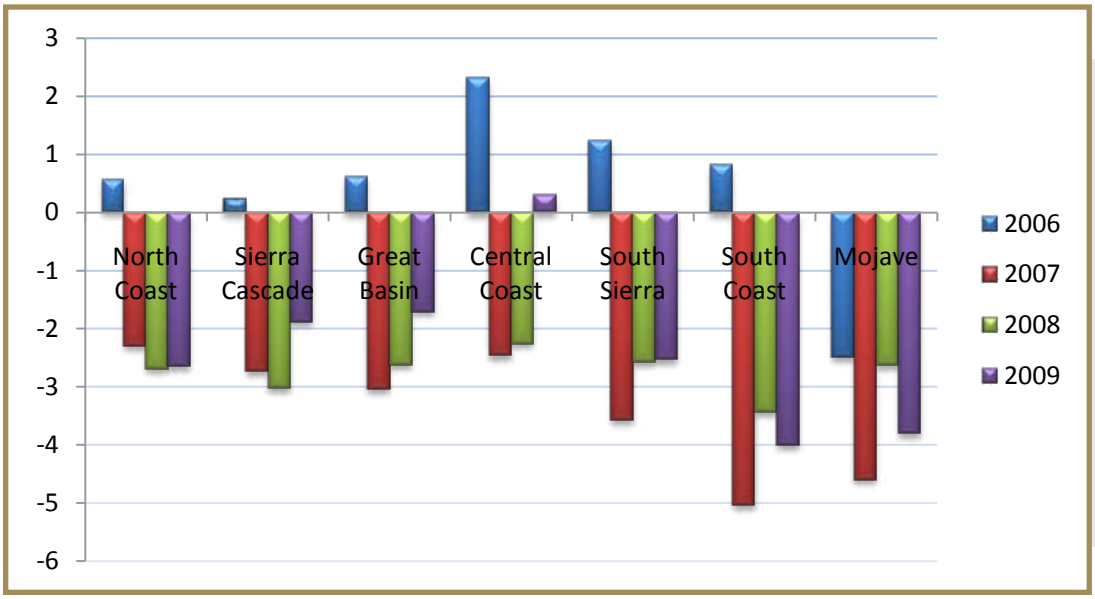
The effects of reduced rainfall are evident from the increase in mortality of many tree species detected via aerial surveys. A ten-fold increase in white fir mortality due to fir engraver attacks, and a two- to three-fold increase in bark beetle-killed pines were observed from 2008 to 2009. A similar pattern was recorded in aerial surveys during the drought conditions in California from 2000 to 2004. Likewise, the dramatic decrease in oak mortality from sudden oak death is attributable to the decrease in rainfall.

In southern California, coast live oak and black oak experienced branch and stem failures following two feet of snowfall on the Cleveland National Forest, and Jeffrey pine were snapped from heavy snow and wind conditions on the Los Padres National Forest. Windstorms also blew down large numbers of blackstain-infected pine on the Shasta-Trinity National Forest.

Approximately 41 million forested acres were flown in CA in 2009 as part of the annual aerial survey program. The survey covered Federal, state and private lands. Over 430,000 acres were mapped with some type of damage due to insects, diseases, or abiotic stress agents.

2009 Aerial Survey area flown and acres of mapped damage. Map: Z. Heath





Palmer drought indices for the seven hydrologic zones in California, 2004-2009. The Palmer Drought Index is an indicator of drought or moisture excess and ranges from -6 to +6, with negative values denoting degree of drought.

Sudden Oak Death

Overall, rates of tree mortality were less than in prior years. New confirmations in northern California expanded *P. ramorum*'s northernmost occurrence in Mendocino county to date.

Phytophora ramorum was found during ground surveys in:

- MacKerricher State Park, Mendocino County
- Orr Hot Springs, Mendocino County
- Alameda, Alameda County

Stream surveys detected *P. ramorum* for the first time within the Mattole River watershed, and continue to detect the pathogen in creeks near McKinleyville. The source of the innoculum has not yet been determined. *P. ramorum* was also detected in 4 nurseries in California in 2009.

Aerial surveys covering the known range of the disease mapped less acreage with oak mortality, and less severe rates of mortality within those areas. Less than 10,000 acres attributed to SOD were mapped, about half of what was mapped in 2008 and a tenth of the acreage mapped in 2007.

New terrestrial confirmations of Sudden Oak Death, 2009.
Map: M. Woods

Native Diseases

Armillaria, heterobasidion root disease (formerly Annosus root disease), black stain, Western gall rust, Diploidia blight, and Schweinitzii root disease were all found to be contributing factors to successful mountain pine beetle, California flatheaded borer, fir engraver, or Douglas-fir engraver attacks throughout the state. Laminated root rot, a disease with limited distribution in California, was identified at two new sites in white fir and Douglas-fir on the Klamath National Forest. Dwarf mistletoe were also found to be contributing to pine and fir mortality. An extensive area of whitebark pine mortality was detected on the northern slope of Mount Shasta, due to limber pine dwarf mistletoe and mountain pine beetle.

Port-Orford-cedar mortality along unnamed stream in the Siskiyou Wilderness Area, Klamath NF. Photo: C. Snyder

This decrease in mortality can be attributed to below-average rainfall over the last two years.

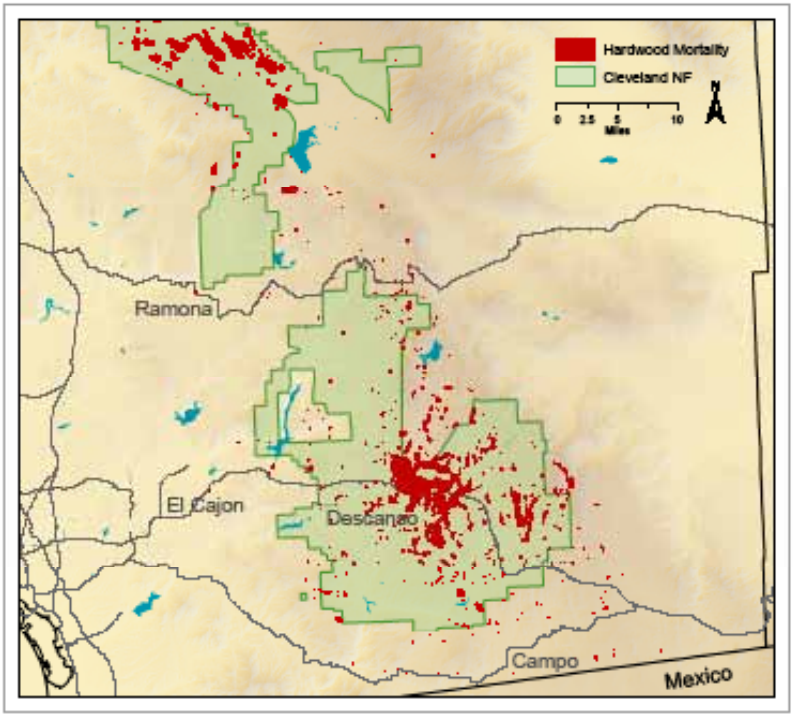
Port-Orford-Cedar Root Disease

Multiple new locations of *P. lateralis* were detected in 2009. The Trinity River drainage continues to be the only major uninfested watershed within the range of POC.

Pitch Canker

Bishop and Monterey Pine stands in and adjacent to Point Reyes National Seashore in Marin County have been experiencing extensive mortality from pitch canker. An increase in pitch canker activity was also observed on the Monterey peninsula.

White fir killed by Heterobasidion root disease and fir engraver beetle, Shasta-Trinity NF. Photo: P. Angwin



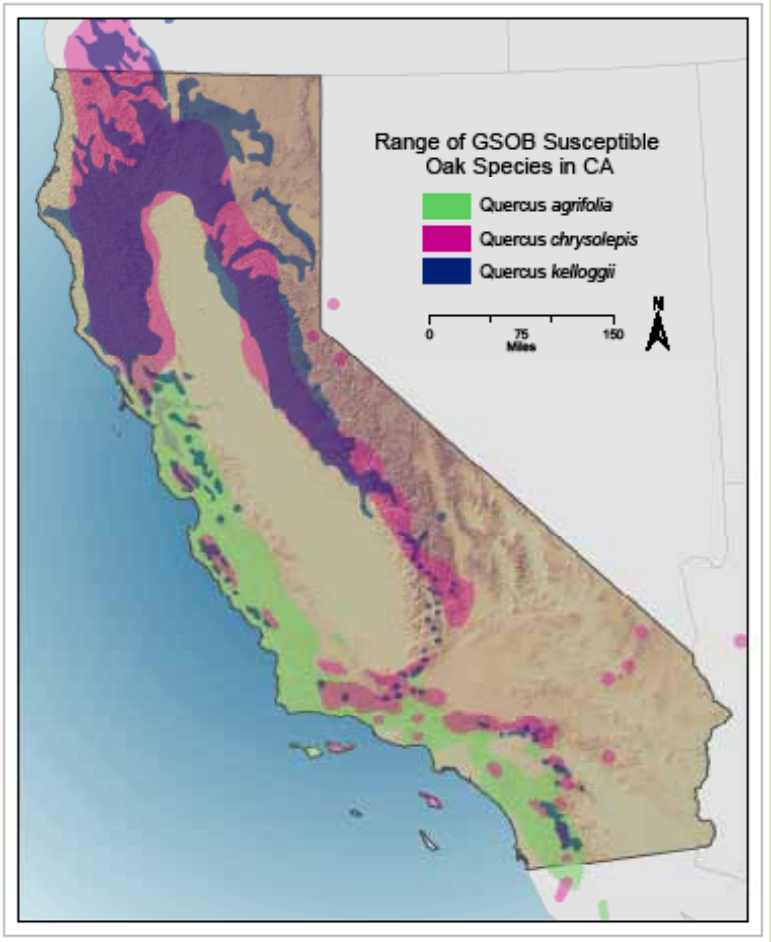
Estimated tree mortality caused by GSOB between 2002-2009, Cleveland NF. Map: M. Woods

Goldspotted Oak Borer (GSOB)

Oak mortality due to *A. coxalis* continued primarily on and around the Descanso Ranger District, Cleveland National Forest, San Diego County. A separate satellite infestation was found near La Jolla, north of San Diego. Aerial and ground surveys indicate more than 20,000 trees are affected by this non-native species and infestation rates on oaks average 65%, and are approaching 100% in areas with long-term tree mortality.

The geographic distribution of the three known oak hosts encompasses approximagtely 39 million acres in California. A GSOB interagency group has been formed to coordinate and address detection, management, and outreach and education issues related to this invasive pest. More information can be found at: http://www.fs.fed.us/r5/spf/fhp/gsob/index.shtml.

Goldspotted Oak Borer, *Agrilus coxalis*.
Photo: S. Blomquist



Range of GSOB susceptible *Quercus* spp. in California.
Map: M. Woods

European Gypsy Moth, Asian Gypsy Moth

In 2009, one European gypsy moth was trapped in Los Gatos, Santa Clara County, and two Asian gypsy moths were trapped in Los Angeles County.

Also, during 2009, eradication efforts using *Bacillus thuringiensis* (Bt) were conducted in Ojai in areas where egg masses were detected in 2008. The eradication treatments were conducted by CDFA and APHIS. Trapping will be conducted in the treated areas in 2010 to see if the treatment was successful or if further treatments are necessary to eradicate this insect

Bark and Engraver Beetles

The number of trees attacked and killed by Jeffrey pine, mountain pine, and western pine beetles increased in 2009. An increase in the number of dead fir trees caused by fir engraver beetle attacks also increased this past year.

Most mortality caused by Jeffrey pine beetle occurred in large diameter and pole size Jeffrey pine trees, throughout the northern part of the Sierra Nevada range and on the San Bernardino National Forest. A number of areas throughout the state were reported to have an increase in number of mountain pine beetle attacks compared to 2008. Significant areas included the Warner Mountain range, Mt. Shasta, and June Mountain Ski Area. Mountain pine beetle also continues to

Jeffrey pine beetle pitch tubes on a tree injured in the 2007 Angora fire. Photo: J. Egan

Western pine beetle-killed large diameter ponderosa pines, Sierra NF. Photo: B. Bulaon

Walnut Twig Beetle

No new infestations of the walnut twig beetle, *Pityophthorus juglandis*, and 1000 canker disease caused by *Geosmithia* sp. have been recorded in CA in 2009. However, this pest complex continues to be common in southern California native stands of *Juglandis californica*.

Red Turpentine Beetle

Attacks by red turpentine beetle increased in primarily mature, fire-killed ponderosa pine following the 2008 fires across northwestern

Red turpentine beetle pitch tubes, Mendocino NF. Photo: C. Snyder

Extensive whitebark pine mortality caused by mountain pine beetle in association with limber pine dwarf mistletoe and drought, Shasta-Trinity NF. Photo: C. Snyder

attack and kill single leaf piñon on the San Bernardino National Forest. Western pine beetle was most active in the southern Cascades, Sierra Nevada and southern California mountains, especially at low-elevations and in plantations in the southern Sierra Nevada range where activity increased.

California fivespined ips activity increased throughout the central and southern Sierra Nevada range in conjunction with western pine beetle and red turpentine beetle. With the economic return for timber being so low and many mills closing, landowners are selling sawtimber for firewood which is remaining on–site longer than usual. Increased slash piles act as breeding centers for Ips beetles and facilitate population increases.

Most forests in northern California and the southern Sierra Nevada range experienced higher levels of fir engraver beetle-caused mortality in both red and white fir. Increase in white fir mortality by fir engraver beetles was commonly found in overstocked stands where trees were also infected with dwarf mistletoe, cytospora canker and/or Heterobasidion root disease.

Defoliators

Douglas-fir tussock moth reached outbreak numbers around Big Bear Lake on the San Bernardino National Forest. High levels of defoliation are predicted to continue into 2010.

Ips-attacked ponderosa pine slash adjacent to a plantation, Sierra NF. Photo: B. Bulaon

Mortality in residual trees associated with an *Ips pini* outbreak in green slash, Modoc NF. Photo: D. Cluck

Defoliation of white fir caused by Douglas-fir tussock moth on the San Bernardino NF. Photo: T. Coleman

Animal Damage

Effects from damage caused by animals was limited to young trees and seedlings. Wild hog populations seem to be increasing in many coastal counties, and for the second year in a row damage caused by porcupines was observed on the Lassen National Forest, after many years of absence. Damage to trees caused by black bears was reported for the first time in Mendocino County. Previously, damage had only been recorded in Humboldt, Del Norte, and Trinity Counties.

Damage caused by porcupines.
Photo: P. Angwin

Jeffrey pines injured during winter storms.
Photo: P. Zambino

Snow and Wind Injury

California black oak and coast live oak experienced branch and stem failure following heavy snowfall on the Cleveland National Forest Branch flagging from broken limbs and stems were also common throughout the area. Many Jeffrey pines snapped from winter storm damage at the Mount McGill Campground, Mt. Pinos Ranger District, on the Los Padres National Forest. Storm damage also caused windthrow of heterobasidion root disease affected Jeffrey pines in this area.

Fire

In 2009, fires burned more than 335,000 acres in California. By far, the largest and most costly was the Station Fire in the San Gabriel Mountains, Angeles National Forest. It was the largest fire in the history of Los Angeles County, burned over 160,000 acres, and threatened not only historic Mt Wilson Observatory, but also LA area communications towers. Extensive insect activity in and adjacent to the burned area is likely in 2010.

Station Fire, Angeles National Forest.
Photo: T. Coleman

Contacts and Additional Information

If you have questions about forest insect and disease activity in California, please contact personnel in one of these regional or field offices:

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United States Department of Agriculture

Forest Service Pacific Southwest Region

California Department of Forestry and Fire Protection

California Forest Pest Council

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